

1. A hermetically closed container for packaging humidity sensitive solid food products, comprising a tube-shaped body made of a composite material comprising an outer coating, at least one outer cardboard layer, an oxygen barrier layer covering the cardboard layer on the inside, and an inner, heat-sealable coating of a thermoplastic material; a closure in the form of a sealed tear-off membrane comprising an oxygen barrier layer and an inner coating of a thermoplastic heat-sealable material; and a deep-drawn bottom made of a composite material comprising an outer varnish layer, at least one cardboard layer, an oxygen barrier layer covering the cardboard layer on the inside, and an inner coating of a heat-sealable thermoplastic material, the bottom with its rim being drawn upwards and outwards over the end face of the body and heat-sealed to the inside and the outside of said body wherein said bottom has a laminate structure comprising from the outside to the inside: a heat-resistant outer varnish layer providing the coated cardboard surface with a coefficient of friction determined with an Instron apparatus according to the ASTM method D 1894-00 of between about 0.10 and 0.45, preferably between about 0.20 and 0.30, at least one cardboard layer, an oxygen barrier layer, an abuse resistant reinforcing carrier layer for the barrier layer between the cardboard layer and the oxygen barrier layer, and an inner heat-sealable coating of a thermoplastic material.
2. The hermetically closed container according to claim 1, characterized in that the hermetic closure corresponds to an average whole container oxygen transmission rate in air at a ambient conditions of 23 C, 50% relative humidity and no absolute pressure differential between the outside and the inside of said container of less than 0.0002 ml O₂ per day and per cm² container surface.
3. The hermetically closed container according to claim 1 such that the outer varnish layer (4) is resistant to discoloration and dislocation under the heat-sealing conditions applied.
4. The hermetically closed container according to claim 2, characterized in that the outer varnish layer is resistant to discoloration and dislocation under heat-sealing conditions comprising a dwell time of from about 1.0 to about 4.0 seconds, preferably from about 1.6 to about 3.0 seconds, at a temperature of about 120 C to about 280 C, and preferably from about 170 C to about 260 C and at a pressure of the heat-sealing tool of about 1 to about 22 MPa.
5. The hermetically closed container according to claim 1 such that the outer varnish layer comprises a heat-seal resistant primer, preferably an acrylic resin based primer.

6. The hermetically closed container according to claim 5 such that the acrylic resin based primer comprises a styrenated acrylic resin.
- 5 7. The hermetically closed container according to claim 5 such that the heat-seal resistant primer of the outer varnish layer is colored and/or contains a pigment.
8. The hermetically closed container according to claim 1 such that the outer varnish layer is applied to a total dry weight ranging from about 0.6 to about 1.8 g/m², preferably from about 0.8
10 to about 1.2 g/m², on the cardboard layer.
9. The hermetically closed container according to 1 such that the oxygen barrier layers are made of aluminum.
- 15 10. The hermetically closed container according to claim 9 such that the oxygen barrier layer comprises an aluminum foil or an aluminized coating on the carrier layer.
11. The hermetically closed container according to claim 9 such that the oxygen barrier layer comprises an aluminum foil.
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12. The hermetically closed container according to claim 11 such that the aluminum foil of the oxygen barrier layer has a thickness ranging from about 6 to about 12 μm, and preferably from about 7 to about 9 μm.
- 25 13. The hermetically closed container according to claim 1 such that an adhesive layer is provided between the aluminum foil of the oxygen barrier layer and the carrier layer.
14. The hermetically closed container according to claim 1 such that an adhesive layer is provided between the aluminum foil of the oxygen barrier layer and the outer cardboard layer.
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15. The hermetically closed container according to claim 14 such that said adhesive layers comprise a polyethylene resin, preferably a low density polyethylene resin, a modified polyethylene resin containing vinyl acetate, acrylate and/or methacrylate monomers and/or an ethylene based copolymer having grafted functional groups.
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16. The hermetically closed container according to claim 1 such that the abuse resistant reinforcing carrier layer is made of a tough, high strength polymeric material having a tensile strength measured according to Iso 1924 of 200 to 500 N/15mm, preferably 350 to 450 N/15mm under the relevant heat-seal temperatures of 100 to 220°C.

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17. The hermetically closed container according to claim 16 such that the abuse resistant reinforcing carrier layer is made of a polyamide or polyester resin, preferably polyethylene terephthalate or polybutylene terephthalate, or an ethylene vinyl alcohol copolymer.

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18. The hermetically closed container according to claim 1 such that the cardboard layers comprise one layer or one or more sublayers joined by means of one or more adhesive layers, wherein the cardboard layer of the bottom is present in a total area weight ranging from about 150 to about 450 g/m², and more preferably from about 180 to about 340 g/m², whereas the cardboard layer of the outer tube-shaped body is present in a total area weight ranging from about 200 to about 600 g/m², and more preferably from 360 to about 480 g/m².

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19. The hermetically closed container according to claim 1 such that the thermoplastic heat-sealable material is heat-sealable at heat-seal temperatures ranges from about 90 to about 200 °C.

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20. The hermetically closed container according to claim 19 such that the thermoplastic heat-sealable material of the heat-sealable coating comprises an ionomer type resin.

21. The hermetically closed container according to claim 20 such that the ionomer type resin is selected from the group comprising salts, preferably sodium or zinc salts, of

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ethylene/methacrylic acid copolymers, ethylene/acrylic acid copolymers, ethylene/vinyl acetate copolymers, ethylene/methylacrylate copolymers, ethylene/methylacrylate copolymers, ethylene based graft copolymers and blends thereof.

22. The hermetically closed container according to claim 1 such that the outer coating of the body comprises low density polyethylene, linear low density polyethylene, medium density polyethylene or mixtures thereof.

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23. A process for the manufacture of a hermetically closed container made from a composite material for packaging humidity sensitive solid food products, comprising a tube-shaped body made of at least one outer cardboard layer, an oxygen barrier layer covering the cardboard layer

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on the inside, and an inner, heat-sealable coating of a thermoplastic material; a closure in the form of a sealed tear-off membrane comprising an oxygen barrier layer, and an inner coating of a thermoplastic heat-sealable material; and a deep-drawn bottom comprising an outer varnish layer, at least one cardboard layer, an oxygen barrier layer covering the cardboard layer on the inside, and an inner coating of a heat-sealable thermoplastic material, the bottom with its rim being drawn upwards and outwards over the end face of the body and heat-sealed to the inside and the outside of said body such that heat-sealing the composite material of said bottom having a laminate structure comprising from the outside to the inside: a heat-resistant outer varnish layer providing the coated surface with a coefficient of friction determined with an Instron apparatus according to the ASTM method D 1894-00 of between about 0.10 and 0.45, preferably between about 0.20 and 0.30, at least one cardboard layer, an oxygen barrier layer, an abuse resistant reinforcing carrier layer for the barrier layer between the cardboard layer and the oxygen barrier layer, and an inner heat-sealable coating of a thermoplastic material, using conductive heating by means of a pressing, tool being heated to a temperature of above 30000 via said inner heat-sealable coating to the inner, heat-sealable coating and the outer coating of said body.

24. The process according to claim 23 wherein said heat-sealing uses a dwell time ranging from about 1.0 to about 4.0 seconds, and preferably from about 1.6 to about 3.0 seconds, a temperature ranging from about 120 C to 280 C, and preferably from about 170 C to about 260 C, and a pressure ranging from about 1 to about 22 MPa.

25. The process according to claim 23 wherein the hermetic closure corresponds to an average whole container oxygen transmission rate in air at a ambient conditions of 23 C, 50% relative humidity and no absolute pressure differential between the outside and the inside of said container of less than about 0.0002 ml O₂ per day and per cm² container surface.

26. The process according to claim 23 wherein the outer varnish layer is resistant to discoloration and dislocation under the heat-sealing.

27. The process according to claim 26 wherein the outer varnish layer is resistant to discoloration and dislocation under heat-sealing conditions comprising a dwell time ranging from about 1.0 to about 4.0 seconds, and preferably from about 1.6 to about 3.0 seconds, at a temperature ranging from about 120 C to about 280 C, and preferably from about 170 C to about 260 C, with a pressure of the heat-sealing tool ranging from about 1 to about 22 MPa.

28. The process according to claim 23 wherein the outer varnish layer comprises a heat-seal resistant primer, preferably an acrylic resin based primer.

29. The process according to claim 28 wherein the acrylic resin based primer comprises a styrenated acrylic resin.

30. The process according to claim 28 wherein the heat-seal resistant primer of the outer varnish layer is colored and/or contains a pigment.

31. The process according to claim 23 wherein the outer varnish layer is applied to a total dry weight ranging from about 0.6 to about 1.8 g/m², preferably from about 0.8 to about 1.2 g/m², on the cardboard layer.

32. The process according to claim 23 wherein the oxygen barrier layers are made of aluminum.

33. The process according to claim 32 wherein the oxygen barrier layer comprises an aluminum foil or an aluminized coating on the carrier layer.

34. The process according to claim 32 wherein the oxygen barrier layer comprises an aluminum foil.

35. The process according to claims 33 wherein the aluminum foil of the oxygen barrier layer has a thickness ranging from about 6 to about 12 μm, and preferably from about 7 to about 9 μm.

36. The process according to claim 23 wherein an adhesive layer is provided between the aluminum foil of the oxygen barrier layer and the carrier layer.

37. The process according to claim 23 wherein an adhesive layer is provided between the aluminum foil of the oxygen barrier layer and the outer cardboard layer.

38. The process according to claim 36 wherein said adhesive layer comprises a polyethylene resin, preferably a low density polyethylene resin, a modified polyethylene resin containing vinyl acetate, acrylate and/or methacrylate monomers and/or an ethylene based copolymer having grafted functional groups.

39. The process according to claim 23 wherein the abuse resistant reinforcing carrier layer is made of a tough, high strength polymeric material having a tensile strength measured according to Iso 1924 of between about 200 to about 500 N/15 mm, and preferably from about 350 to about 450 N/15 mm under the relevant heat-seal temperatures ranging from about 100 to about 220 C.
40. The process according to claim 39 wherein the abuse resistant reinforcing carrier layer is made of a polyamide or polyester resin, preferably polyethylene terephthalate or polybutylene terephthalate, or an ethylene vinyl alcohol copolymer.
41. The process according to claim 23 wherein the cardboard layers comprise one layer or one or more sublayers joined by means of one or more adhesive layers, wherein the cardboard layer of the bottom is present in a total area weight ranging from about 150 to about 450 g/m², and more preferably from about 180 to about 340 g/m², whereas the cardboard layer of the outer tube-shaped body (1) is present in a total area weight of from about 200 to about 600 g/m², and more preferably from about 360 to about 480 g/m².
42. The process according to claim 23 wherein the thermoplastic heat-sealable material is heat-sealable at heat-seal temperatures ranging from about 90 to about 200 C.
43. The process according to claim 42 wherein the thermoplastic heat-sealable material of the heat-sealable coating comprises an ionomer type resin.
44. The process according to claim 43 wherein the ionomer type resin is selected from the group comprising salts, preferably sodium or zinc salts, of ethylene/methacrylic acid copolymers, ethylene/acrylic acid copolymers, ethylene/vinyl acetate copolymers, ethylene/methylacrylate copolymers, ethylene/methylacrylate copolymers, ethylene based graft copolymers and blends thereof.
45. The process according to claim 23 wherein the outer coating of the body comprises low density polyethylene, linear low density polyethylene, medium density polyethylene or mixtures thereof.